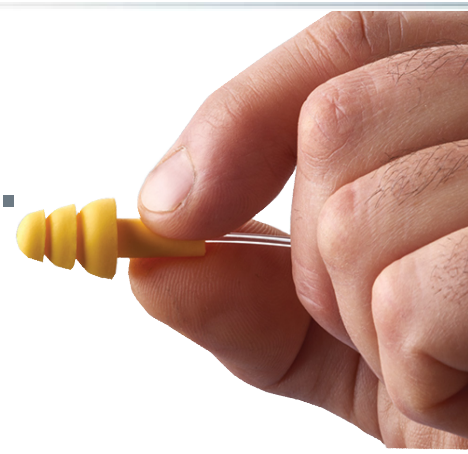
3M Personal Safety Division

3M™ E-A-Rfit™ Dual-Ear Validation System

The Right fit test. Right now.



3M E-A-Rfit Dual-Ear Validation System

User Manual

3M™ E-A-Rfit™ Dual-Ear Validation System

Dangers, Warnings, Cautions & Battery

Warning!

To avoid the risk of electric shock, which if not avoided could result in serious injury or death:

- Do not immerse the 3M E-A-Rfit Dual-Ear Validation System in any liquid.
- Use indoors only.
- Disconnect power cord before cleaning.
- Clean the exterior surface of the speaker with a clean anti-static cloth. Do not attempt to clean the interior components.
- There are no user serviceable parts.
  - The 3M E-A-Rfit Dual-Ear Validation System must be returned to the manufacturer for repair.

Caution!

General

- To avoid possible environmental contamination, dispose of the 3M E-A-RFit Dual-Ear Validation System according to applicable governmental regulations.
- Substitution of components may impair the accuracy of the instrument. Repair should be performed by authorized service personnel only.
- Read the manual before operation.

Hearing Protection and Measurements

Test results, PAR values and hearing protector sufficiency determinations are based upon data entered by the operator and from the employee's test results at a given 3M E-A-Rfit Dual-Ear Validation System testing session.

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Introduction

The 3M™ E-A-Rfit™ Dual-Ear Validation System is comprised of hardware and software that enables the operator to test and record the personal attenuation rating (PAR) of many hearing protection products by 3M. (See Appendix B, “Model, Parts and Accessories” for details.)

Getting Started

The 3M E-A-Rfit Dual-Ear Validation System contains the components illustrated below. Please follow the illustrated quick set-up guide in the lid of the case to assemble your hardware.

Figure 1: 3M E-A-Rfit Dual-Ear Validation System kit contents

Install 3M E-A-Rfit Dual-Ear Software

1. Insert the 3M E-A-Rfit flash drive into your computer’s USB drive.

Figure 2: Installing USB Drive into the Computer

2. Run the **setup.exe** file by double-clicking the file.
3. Follow the screens prompts by clicking **Next** through the wizard and click **Finish** to complete the installation.

Hardware setup: speaker stand assembly and cable connection

1. After removing the items from the case, lay the speaker down on a table and thread the stand post to the bottom of the speaker (see Figure 3-A). Then attach the stand base to the stand post by threading clockwise (see Figure 3-B). Set upright on table (see Figure 3-C).

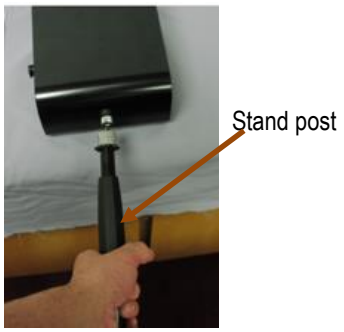


Figure 3-A. Thread stand post to bottom of speaker

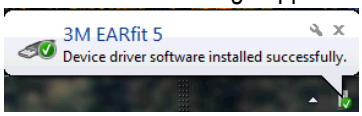
Figure 3-B: Thread stand post to bottom the stand base

Figure 3-C: Assembled

Figure 3: Speaker Stand Assembly

2. To attach all the necessary cords, remove the power cord, the microphone assembly, and the USB cord from the grey compartments of the kit.

- After plugging the power cord into a power outlet, attach the other end of the power cord into the top socket on the back of your speaker. A green light will illuminate.
- Insert the microphone assembly into the middle socket on the back of the speaker being careful to align the microphone plug into the socket.
- Hang both microphones by their integrated clips to the clip on the front of the speaker.
- Attach the USB cord into the bottom socket on the back of the speaker and insert the other end of the USB cord in the computer's USB port.
- A device driver message appears in the task bar when connecting the speaker component to the USB.



- A flashing red light will illuminate and then go dark when the speaker is successfully connected.

Figure 4A: Connecting Hardware

Figure 4B: Hardware Connected

Software Start-up

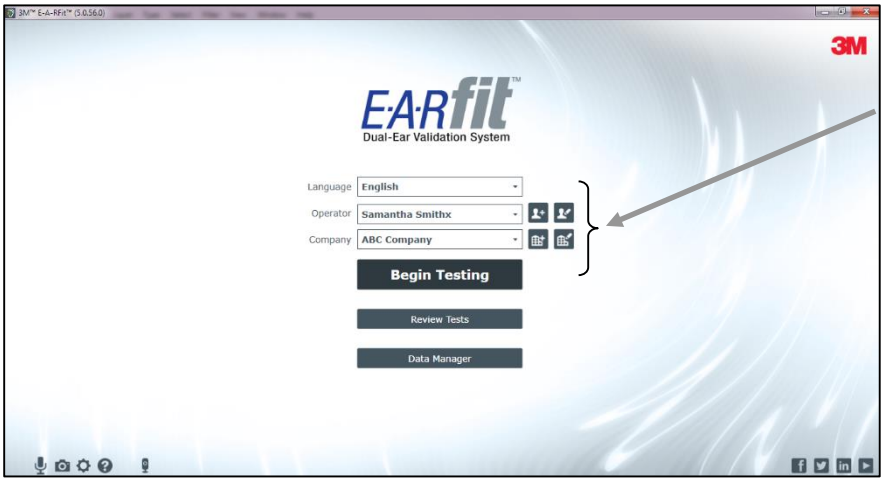
The home screen is used to perform an E-A-Rfit validation test. The start-up parameters entail the selection of the language, operator, and company. It may also be used to begin testing, review hearing protection fit-tests, and access the data manager (see following sections for details).

✓ **Tip:** At any point in the subsequent E-A-Rfit testing screens, click icon or the E-A-Rfit logo to return to the home screen.

Home Screen

1. Open the E-A-Rfit software by double- clicking on the icon.

2. In the **Home screen,** select the language, operator, and company information. (Please refer to 1a – 1c.)



Select:
1a. Language
1b. Operator (person conducting the test)
1c. Company (when applicable) using drop down boxes.

Figure 5: Start Page

a. Language field: The language field is saved as the default language once selected.

- To **select the Language**, click on the drop down box and begin typing while noting the text will highlight. Press **Enter** to select. You may also use the slider bar to scroll and click the desired language. The software will save the selected language as the default for subsequent uses.

Language: click and/or use the slider bar to select your language.

Slider bar

Figure 5a: Home Page: Selecting Language

b. Operator field: The person conducting the test is the operator.

- To **add an operator**, click on the button and enter the last and first name fields (required) and any other applicable fields. Click Save to store or click "x" to close.
- To **edit an operator**, click on the button and enter the appropriate fields. ***Note:*** *the light gray button indicates the button is not accessible until an operator is added to the software.*

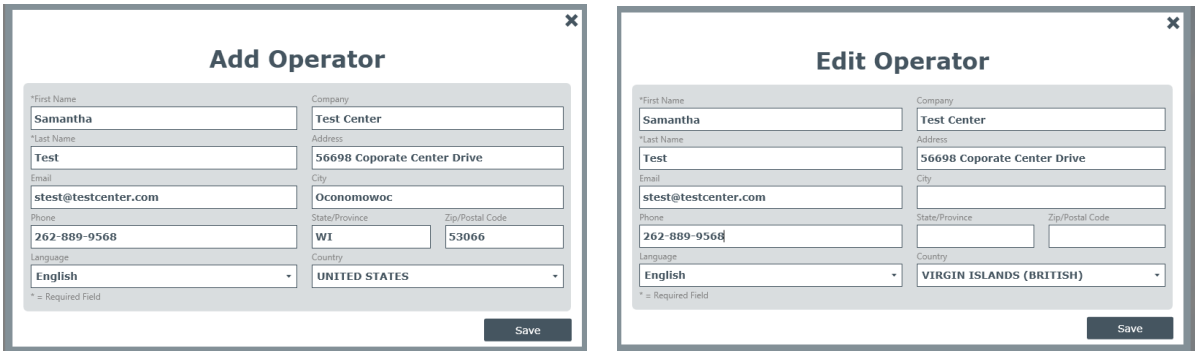
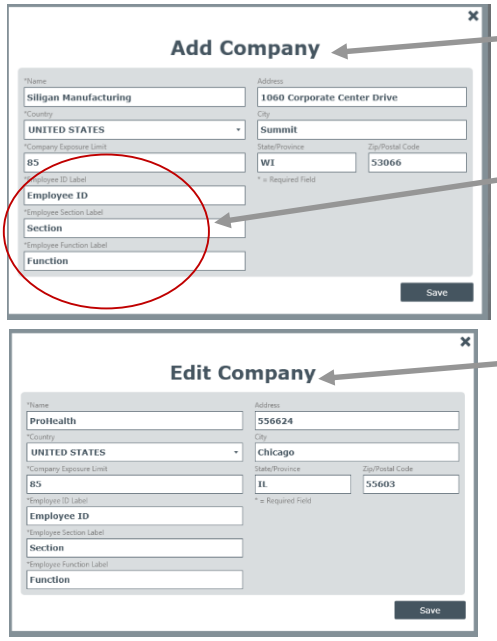


Figure 5b: Add and Edit Operator Dialog Boxes

c. Company field: Basic company information is stored in this dialog box and may be used in reports. **Company Exposure Limit** pertains to the maximum level of noise a company wishes to protect an employee's exposure. This number is up to the discretion of the operator but may be either the legal limit or a number between 80 to 90 dB.

In the **Company screen**, there are three optional **Label fields** which allow you to customize the name that appears in the software and in the reports. The fields include the Employee ID, Employee Section, and the Employee Function. For example, if the company you are working with has "Departments" instead of "Sections", you may add the alternative name, and it will appear in the Employee records and in the reports.

➢ To **add** or **edit** a company record, click on the / icon. Enter the appropriate fields and click **Save**. Note the asterisk fields are required prior to saving.



Add Company: Enter in company information as needed and click Save. This will store in the company records.

Label fields: Enter in a customized field names and it will appear in the software screens and in the reports.

Edit Company: Type over the text or add as needed and click Save.

Figure 5c: Home page: Add and Edit Operator Dialog Boxes

2. Click on **Begin Testing** button to start testing with the 3M™ E-A-Rfit™ Dual-Ear Validation System.

   ✓ ***Tip:*** for reporting, click on **Data Manager** button. (See Data manager section for details.)

   ✓ ***Tip:*** for test results, click on **Review Tests** button. (See Review Tests section for details.)

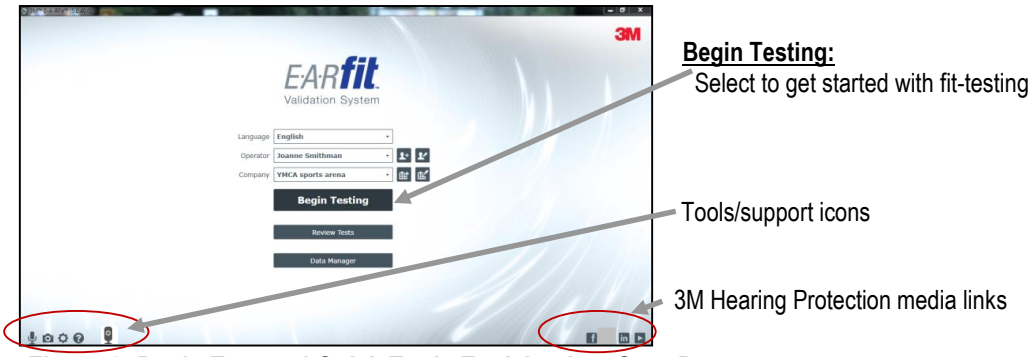


Figure 6: Begin Test and Quick Tools Explained on Start Page

Quick Support Tools and 3M HPD media links	**Explanation**
Verify Microphone	Used to verify microphone is functioning correctly. See Figure 2-A for screen example.
Screen Capture	Provides the capability to capture a screen for user support purposes.
Settings	Provides a link to database folder storage options and reporting settings. (See Settings section for more information.
User Support	Used to send a technical support question with the ability to attach a screen capture. (See User support section page xxx.)
Speaker not connected	Displays a red "x" speaker icon indicating the Speaker is not connected. (Check speaker cables and USB is connected to the computer.)
Speaker connected	Displays a speaker icon when connected appropriately for Fit-Testing.
or Speaker and Microphone calibration	Speaker and Microphone calibration icon notice. When you mouse over, a pop text appears explaining the due dates for speaker and microphone calibration.
Facebook	3M Hearing Protection on Facebook link provides dialog with work and friends through the online social media when signed in.
Linked In	3M Hearing Conservation LinkedIn Community business collaboration group.
Video	3M Hearing Protection video training links you to 3M™ E-A-R™ Hearing videos.

Table 1: Support and 3M HPD Media Links

Microphone Verification

The microphone speaker serial number, sensitivity and speaker serial number and firmware version will automatically be detected and stored in the software under the system details section of the user support screen.

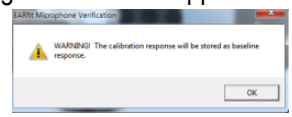
Before you can begin testing employees, you will verify the microphone and speaker are in good working order.

➢ To start the verification, please follow below:

1. Slide the right (red) and left (blue) microphones into the speaker clip as illustrated on the microphone verification screen in the software.

2. Click the **Start Verification** button (see Figure 7).

   - A warning statement will appear indicating E-A-Rfit will store the baseline data as the new response. Click Ok.



   ✓ ***Note:*** The microphone verification process must be conducted before you begin testing each time the software is launched. You may re-check the microphone by going back to the home screen by clicking on the microphone icon.

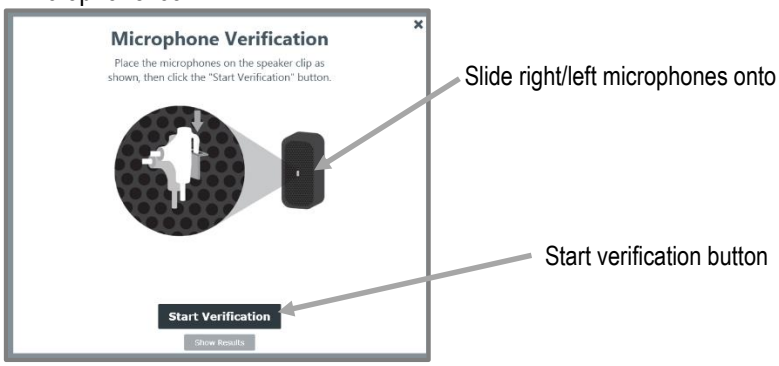

Microphone Verification
Place the microphones on the speaker clip as shown, then click the "Start Verification" button.
Start Verification
Show Results
Slide right/left microphones onto clip on front of speaker
Start verification button

Figure 7: Microphone Placement and Start Verification Button

2. Click **Continue to Testing** button (when connected properly) in the microphone verification screen appear. (See below for details.)

   ✓ If microphone is functioning correctly, the **Verified** **icon** will appear. Click **Continue to Testing** button (see Figure 8-A).

   ✓ If connected incorrectly, **Verification Failed** **icon** will appear. Please unconnect and reconnect microphones to speaker and press **Try Again** button (see Figure 8-B). See troubleshooting section.

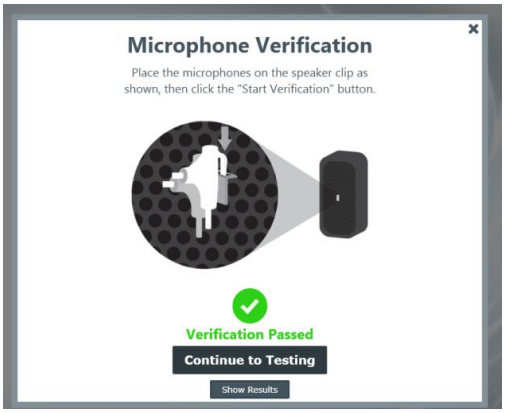

Microphone Verification
Place the microphones on the speaker clip as shown, then click the "Start Verification" button.
Verification Passed
Continue to Testing
Show Results

Figure 8-A: Microphone Verification Verified

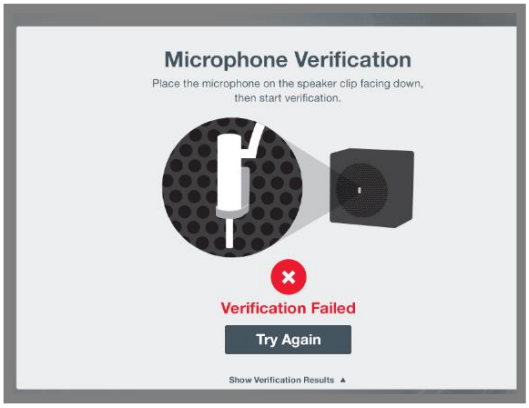

Microphone Verification
Place the microphone on the speaker clip facing down, then start verification.
Verification Failed
Try Again
Show Verification Results

Figure 8-B: Verification Failed Prompt

3. (Optional) Click **Show Results** button to view the verification test results. Click **Show Results** button to view graph details.

- The verification graph will display four curves (explained in the table below) of the 7 tested octave band frequency levels.

Verification test results	Explained
Maximum	Indicates the upper boundary of proper operation.
Baseline Response	Plots the first response curve for the microphone. This will be used through the life of the microphone to monitor changes.
Today's Response	The last response curve for the microphone.
Minimum	Indicates the minimum boundary of proper operation.

Table 2: Verification test results

Figure 9A: Verification Test Results with Legend

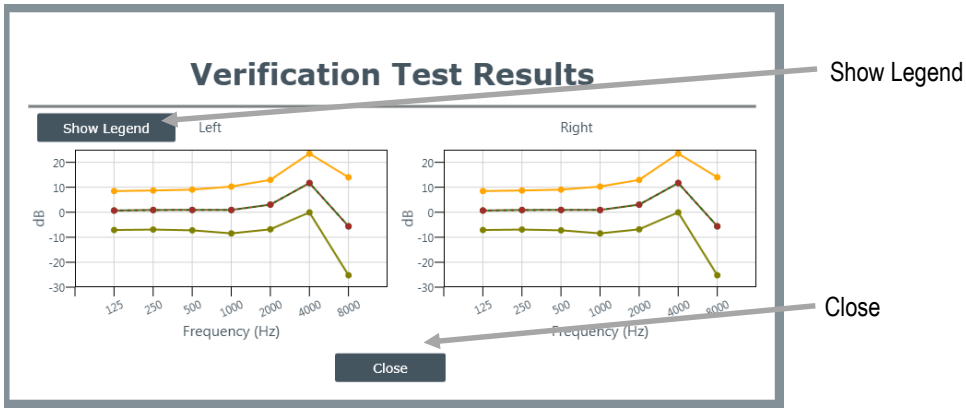


Figure 9B: Verification Test Results without Legend

Run Test Overview

How it Works?

The 3M™ E-A-Rfit™ Dual-Ear Validation System encompasses a specially designed loudspeaker that allows for an accurate presentation of the test signal and real-time communication between the microphones, speaker and software. The dual-element microphones make it possible to measure the sound level simultaneously inside and outside the hearing protector.

The external microphone measures the level of the test signal outside the ear. The internal microphone is connected to one of the specially modified 3M™ Hearing Protectors Probed Earplugs to allow measurement of the sound level inside the wearer's earcanal while the earplug is worn.

The difference between the outside and inside microphone levels is used to calculate the Personal Attenuation Rating for each employee; the amount of noise reduction in decibels obtained by that individual with the specific model and size of hearing protector being worn. The PAR is an indication as to whether or not the standard version of that model of hearing protector, without the test probe attached, will provide sufficient attenuation for the noise exposure in the workplace.

After properly setting up the fit-test and running the test, the software will quickly measure the noise reduction or attenuation of the earplugs the employee is wearing. The results can be used to retrain the worker to select and wear hearing protection more effectively and provide positive reinforcement when they do so.

Below explains the steps to run a test once the employee is seated and has the probed hearing protectors inserted. (For a live demo of 3M E-A-Rfit Validation System and fit testing, please refer to http://earfit.3m.com.)

Run Test

1. Welcome the employee to sit in a chair in front of the speaker. Explain the fit test process.

2. In the software, select the **employee** via the drop arrow. Begin typing and press enter to select an employee. If adding an employee, click the icon to **Add** (refer to step 2).

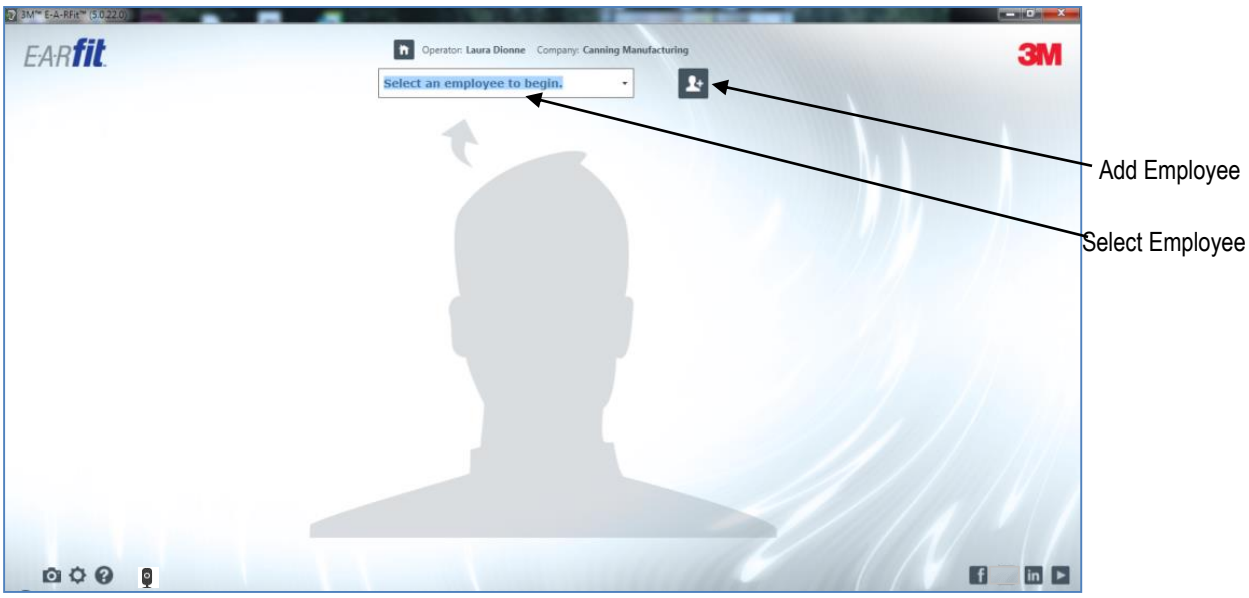


Figure 10: Select an Employee

➢ Once selected, these buttons will appear: Select Product, , Run Test, Test Instructions.

3. When adding or editing, enter the appropriate fields by clicking and highlighting the pre-populated text, if applicable. (See Table 2 for details.) Click Save button when complete.

➢ To **Edit an employee** select the icon when visible after an employee is added to the software.
➢ Highlight and/or type over the appropriate text and click Save button. This will return you to the run test screen.

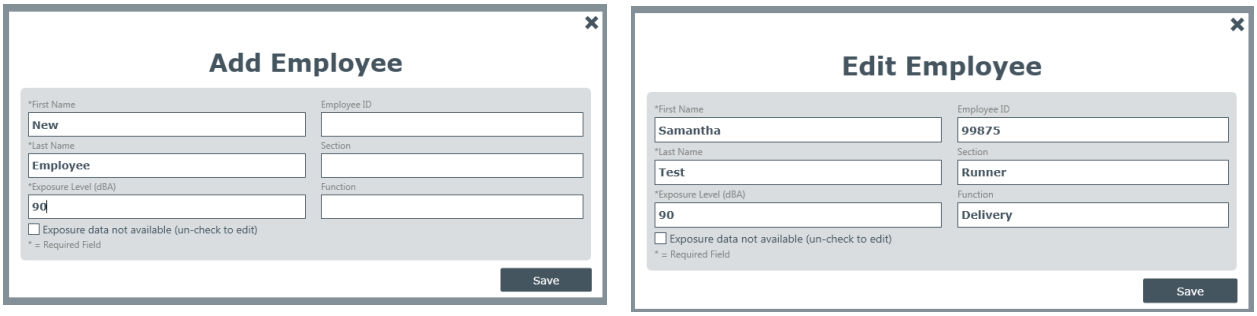


Figure 11: Add and/or Edit Employee Record

Employee fields	Explained
Exposure Level field	Enter in the employee's A-weighted Sound Pressure Level (dBA) or the employee's A-weighted exposure level over an 8 hour period (also noted as TWA) if applicable.
Exposure data not available checkbox	Check this box when hearing exposure levels are unknown.
Employee ID	(Optional, user-customizable field used to correspond to the users' needs.) ● Enter in the employee's company/ID number.
Section	(Optional, user-customizable field used to correspond to the users' needs.) ● Enter in your company's section number of the employee. For example, assembly line at a manufacturing site.
Function	(Optional, user-customizable field used to correspond to the users' needs.) ● Enter in the employee's work position/job function.

Table 3: Add/Edit Employee Explained

4. **Fit testing** is conducted with the employee and operator. Click the **Test instructions** button for an illustration of fit test setup.

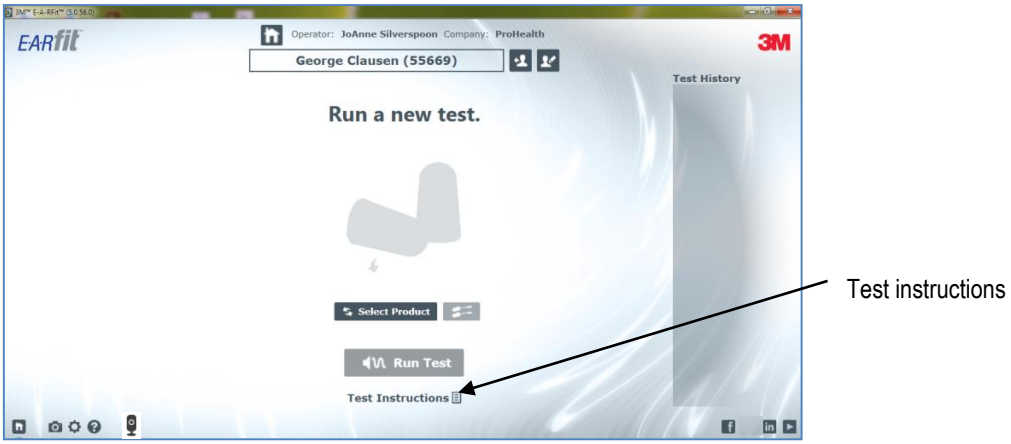


Figure 12: Employee Selected in Run Test Screen

5. Click **Select Product** and/or **Change Product** button to add and/or change a product for new/previously tested employees.

   - To navigate and/or select a product, expand the selector arrows by clicking on an arrow(s). Using the right-hand scroll bar, drag up/down accordingly. To select, click on a product type and it will appear on the run test page.

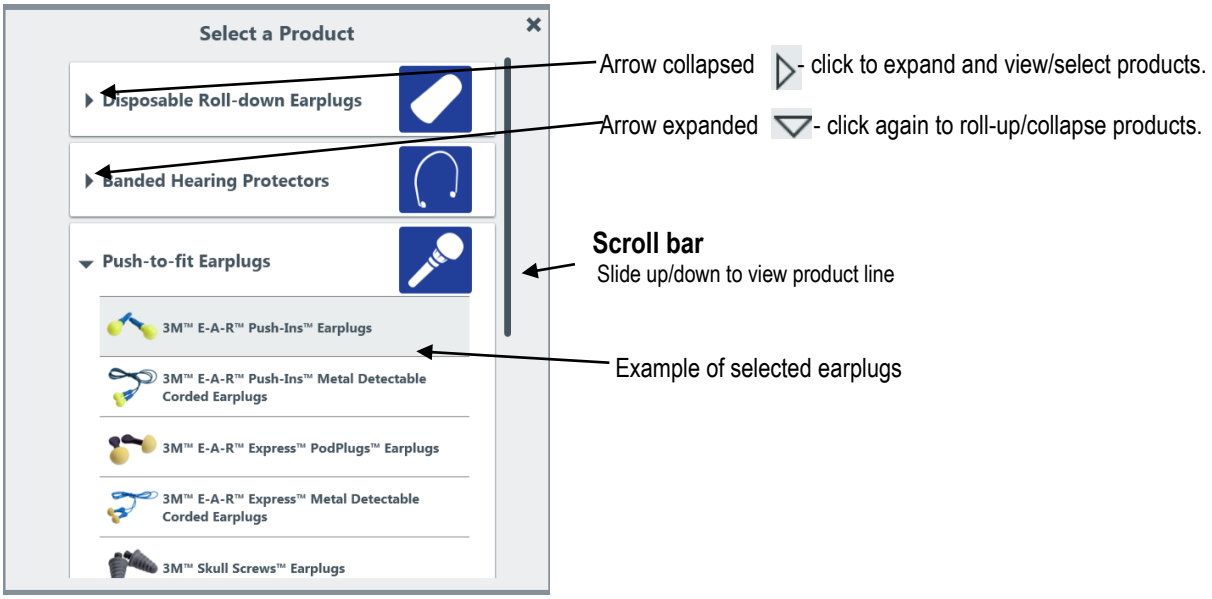

Select a Product
Disposable Roll-down Earplugs
Banded Hearing Protectors
Push-to-fit Earplugs
3M™ E-A-R™ Push-Ins™ Earplugs
3M™ E-A-R™ Push-Ins™ Metal Detectable Corded Earplugs
3M™ E-A-R™ Express™ PodPlugs™ Earplugs
3M™ E-A-R™ Express™ Metal Detectable Corded Earplugs
3M™ Skull Screws™ Earplugs
Arrow collapsed - click to expand and view/select products.
Arrow expanded - click again to roll-up/collapse products.
Scroll bar
Slide up/down to view product line
Example of selected earplugs

Figure 13: Product Selector Dialog Box

6. With the employee properly positioned, click on the **Run Test** button. You will hear a short test signal from the loud speaker.
   - ✓ **Employee History** column displays the products previously tested and shows the PAR value, the date and time tested, and if it passed or failed .

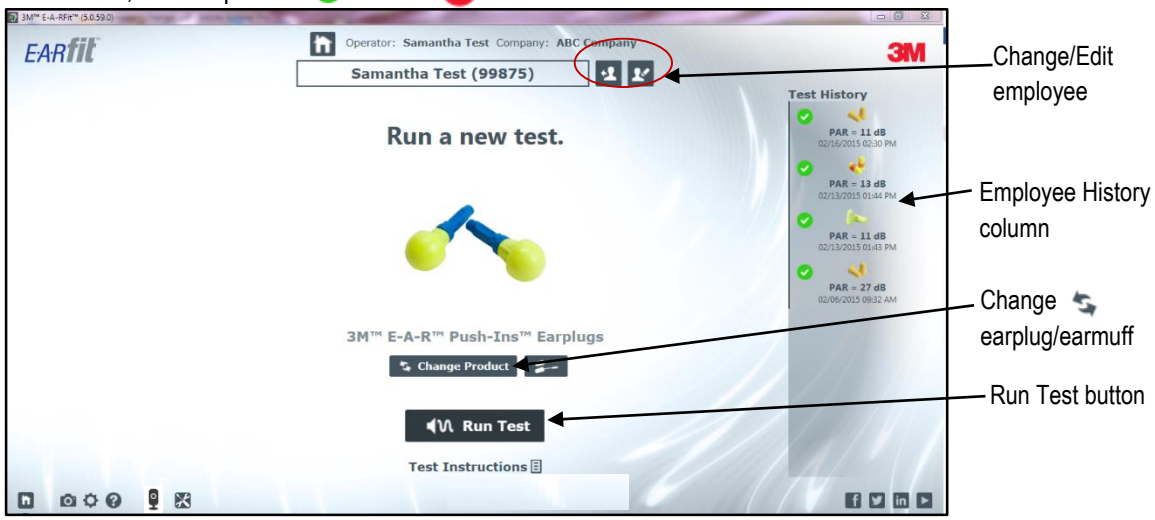


Figure 14: Run Test Screen

7. Once the test signal ends, the tests results page will display the measured attenuation. The results can be used to retrain the worker to wear hearing protection more effectively and provide positive reinforcement when conducted.

8. (Optional) **Test another product** or **Retest Product** using the Retest Product or Test Another Product buttons.

9. Once completed with the employee's fit test, click the end session button (End Session 00:18). Note: the session timer will start and stop when a different/new employee is selected, or the session is ended by the operator, or when the software is closed.

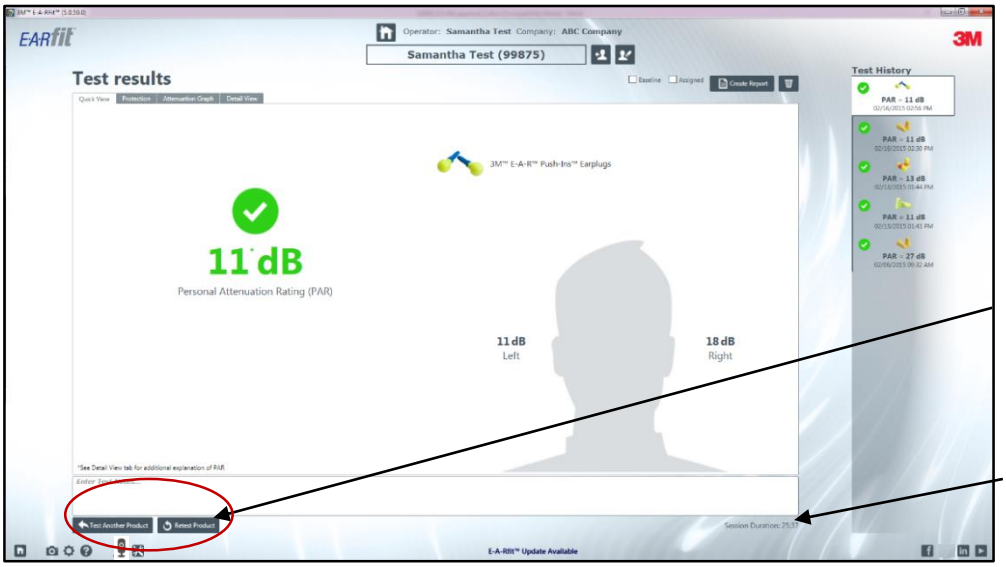


Figure 15: Test Results

Test Results

The hearing protection fit-test results are displayed on the tabs entitled Quick View, Protected Exposure, Attenuation Graph, and Detail View. The action buttons are repeated in each tab and are identified in Table 3 below. (Please refer to Table 1 for the repeated tool support icons and 3M™ Hearing Protection Links.)

Quick View

The **Quick View Tab Results** main components detail the PAR results from the fit-test, the values in the left and right ear, the type of hearing protector, Baseline and Assigned check boxes, the Session Duration, and the Test History column.

When you visit this view, the **Baseline** and **Assigned** checkboxes may be assigned or selected. The **Baseline** indicates the benchmark or target of the measurement. The **Assigned** checkbox may be used when the employee achieves adequate hearing protection, and the operator recommends wearing this hearing protector while working in a noise environment. If these are assigned, this information will appear in the test history column with the hearing protection product, the PAR value, and the date and time of the test. It will also appear on the company and employee reports.

- ***Note:*** a data export may be exported into a report or to Excel. (See Data Manager for additional details.)

Measurements and hearing protection product

When viewing this screen, you can review the test results and give guidance to the employee. The measurements and the test results symbols are identified below:

- The **PAR** is displayed for both the left and right ears as well as a binaural. The values have the uncertainty subtracted and displayed on this tab. The Binaural is calculated using the lowest PAR value per octave band for each ear.
  - The checkmark indicates the measurement passed, denoting the employee's binaural PAR minus the uncertainty is equal or above the target minimum attenuation (TMA). TMA is the employee's exposure minus the company exposure limit. For example, if you enter the employee's exposure of 95 dBA and the company exposure limit is entered as 80 dBA, then the TMA is 15 dB. The employee's binaural PAR minus the uncertainty must be 15 dB or above in order to "Pass". The operator may mark the measurements that **Pass** as a **baseline** and assign the hearing protector if desired.
  - The checkmark indicates the employee's binaural PAR minus uncertainty failed to meet the target minimum attenuation. Although you may mark a failed measurement as a baseline, you will not be able to assign a hearing protector that has failed. ***Note***: the uncertainty is displayed in the **Detail View Tab**.
  - The caution symbol is displayed under two different conditions. In both conditions, a pop-up will alert the operator. The first condition is when the PAR value is less than 10 dB at 125 Hz. The second condition is when there is a 15 dB or more difference between the left and right PAR measurements. In both cases, the pop-up will suggest that the hearing protector be retested after adjusting how it is worn. Although you may mark a cautioned measurement as a baseline, you will not be able to assign a hearing protector when a caution symbol is present.
  - A gray symbol is displayed if the employee record does not have a noise exposure level included. Without an employee exposure value, protection sufficiency cannot be determined. Although you may mark a grey measurement as a baseline, you will not be able to assign a hearing protector where protection sufficiency cannot be determined.
- The tested hearing protection is identified (see 2) and stored as History in the **Test History** column (See 4).
- The **Left and Right Values** are the computed results from the fit-test for each ear with the uncertainty value subtracted. (See 3.) (See **Detail View** for additional details.)

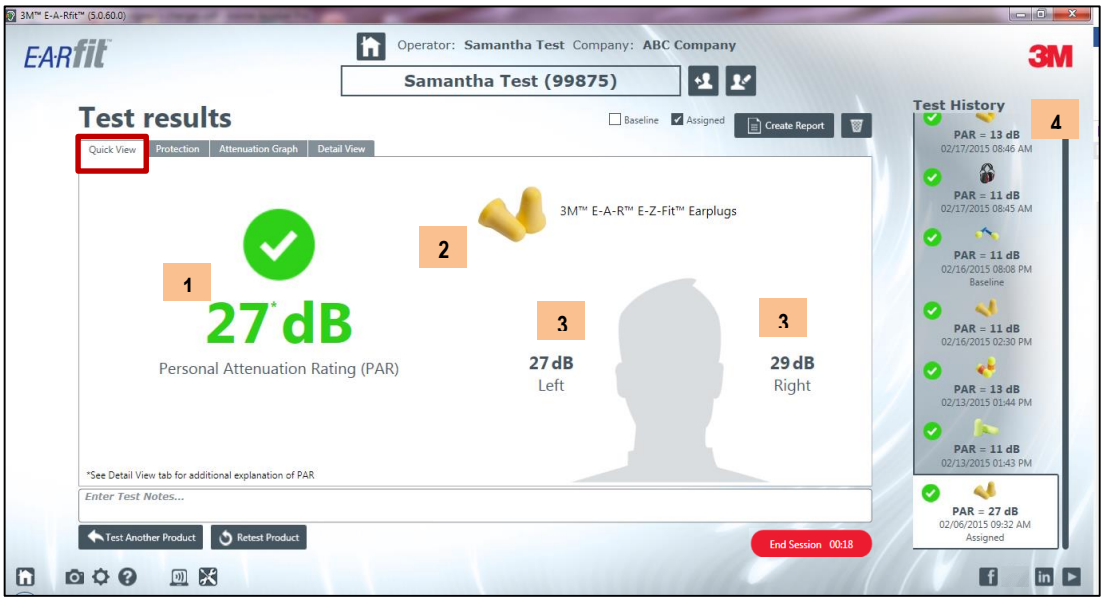


Figure 16: Quick View Tab Results

The table below explains the actions you may perform in the test results screens. (Note: See Table 1 for explanation of the tool support icons, located on bottom right-side of screen, and the 3M Hearing Protection media icons, located on left-side of screen.)

Action buttons	Explained
Session Duration and End Session button	Session Duration is the length of time the employee was fit-tested for each hearing protection product (if more than one is tested). The session timer will start and stop when a different employee is selected, or the session is ended by the operator, and/or when the software is closed. To end the session, click on the End Session 00:18 button.
Retest product button	Retest Product Retest Product button will immediately run a new test of the same product.
Test another product button	Test another product Test Another Product button opens the product selector to allow changing to a different 3M™ Hearing Protector product.
Baseline	(Optional): Check the baseline is used to set a benchmark when the employee is first tested. Once checked ☐ Baseline, it will store and display in the history column.
Assigned	(Optional): Assigned feature may be used when the employee achieves adequate hearing protection, and the operator recommends wearing this hearing protector while working in noise. Once checked ☐ Assigned, it will appear in the history column and store in the database as the primary hearing protector.
Create Report	Create a report Create Report opens a window to view two types of reports, **Employee Report** and **Company Report**. ✓ To view, click View Employee Report and View Company Report buttons. Note that the **View** buttons toggle between **Employee Report** and **Company Reports** when selected. ✓ To print, click on the Print Employee Report or Print Company Report button depending on which one appears. Toggle between Print Employee and Print Company Reports via the **View** buttons. Print the report that appears, if desired.
Delete	The delete icon allows you to delete a fit-test when selected from the Test History column. • To delete, first select a product from the test history column. Then select the icon. Confirm the prompt Okay or Cancel to return without deleting the measurement.
Change employee/ Edit employee icons	Change employee icon allows you to return back to the run test screen and select a different employee. Edit employee icon allows you to change the employee record information.
Notes	Add employee text to the notes field when applicable. These will appear on the Company Report and store in the E-A-Rfit software. Notes can be edited at any time.
Home **E-A-Rfit logo**	Home icon is displayed to provide a quick return to the home screen when applicable. Earfit logo, when clicked, EARfit will also return you to the home screen.

Table 4: Test Results User Actions

Protection Results

The **Protection Tab Results** shows the employee's protected exposure as it compares to the European Union guidance document EN 458 and in regulatory documents in other parts of the world. Table 1 identifies the screen icons and action buttons.

- **Tip:** How is protected exposure calculated? The protected exposure is calculated by subtracting the binaural PAR (minus the uncertainty) from the employee's exposure.

Looking at the Safety guide, the "**you are here indicator and dB Level"** indicates if the employee's fit-test results are insufficient, acceptable, good, acceptable, or at risk of overprotection.

The **Fitting Gauge** is a rough estimate of where the employee's PAR value compares to what can be achieved with this hearing protector. (See 2 below.)

- **How to view percentage detail on fitting gauge?** Roll your mouse-over the green needle and a pop-up window explains your fitting percentage fit compared to the laboratory population. Also, roll your mouse over the "**Your Fit**" and a pop-up appears with the PAR value (See 3).

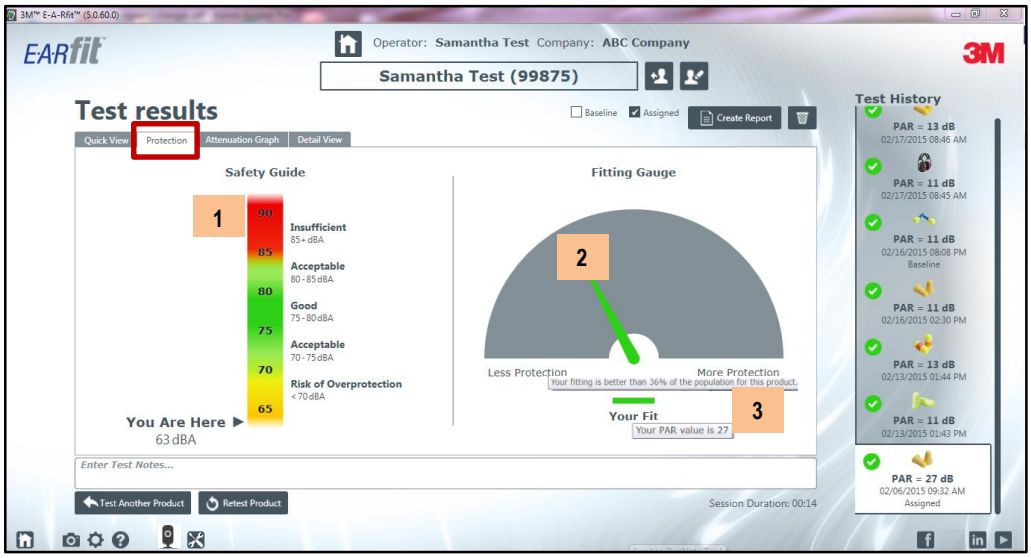


Figure 17: Protection Tab Results

Attenuation Graph

The **Attenuation Graph Results Tab** plots the PAR at each of the seven octave bands for the left ear (blue) and the right ear (red). (See 1 and 2.) The PAR values for left, right, and binaural are values carried over from the Quick View tab. (See 3.) This information allows the operator to analyze the shape of the curve and look for abnormalities.

Figure 18: Attenuation Graph Results Tab

Detail View

In the **Detail View Tab Results**, the full value of the PARs are displayed for Left, Right, and Binaural along with associated uncertainty values.

In the middle of the screen, the formula for the protected exposure is displayed and calculated providing the results for the recommended user protected exposure. The formulas are provided below:

- **Protected Exposure:** employee exposure (inputted via the add/edit icons) subtracting the binaural PAR (minus uncertainty) equals the protected exposure.
- **Maximum Protection**: company exposure limit plus the binaural PAR (minus the uncertainty) equals the protected maximum.

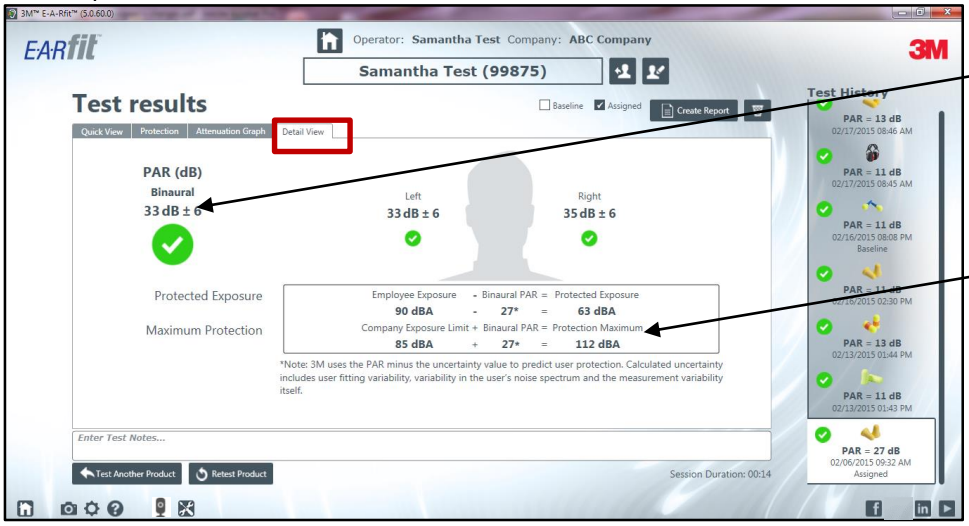

EARfit
Operator: Samantha Test Company: ABC Company
Samantha Test (99875)
3M
Test results
Quick View
Protection
Attenuation Graph
Detail View
PAR (dB)
Binaural
33 dB ± 6
Left
33 dB ± 6
Right
35 dB ± 6
Protected Exposure
Maximum Protection
Employee Exposure - Binaural PAR = Protected Exposure
90 dBA - 27* = 63 dBA
Company Exposure Limit + Binaural PAR = Protection Maximum
85 dBA + 27* = 112 dBA
*Note: 3M uses the PAR minus the uncertainty value to predict user protection. Calculated uncertainty includes user fitting variability, variability in the user's noise spectrum and the measurement variability itself.
Test History
Enter Test Notes...
Test Another Product
Retest Product
Session Duration: 00:14
PAR binaural with +/- variability.
Computed protected exposure and maximum protection

Figure 19: Detail View Tab Results

Reports

There are two types of reports used to either view online, save as a file, and/or print.

Employee Report

The employee report provides a basic personalized fit-test report. When the Create Report button is selected from the Test results page, the employee report will appear as a mid-size pop-window. To view the report, select the right-hand slider bar to scroll through the details.

The employee report actions are identified in Table 5.

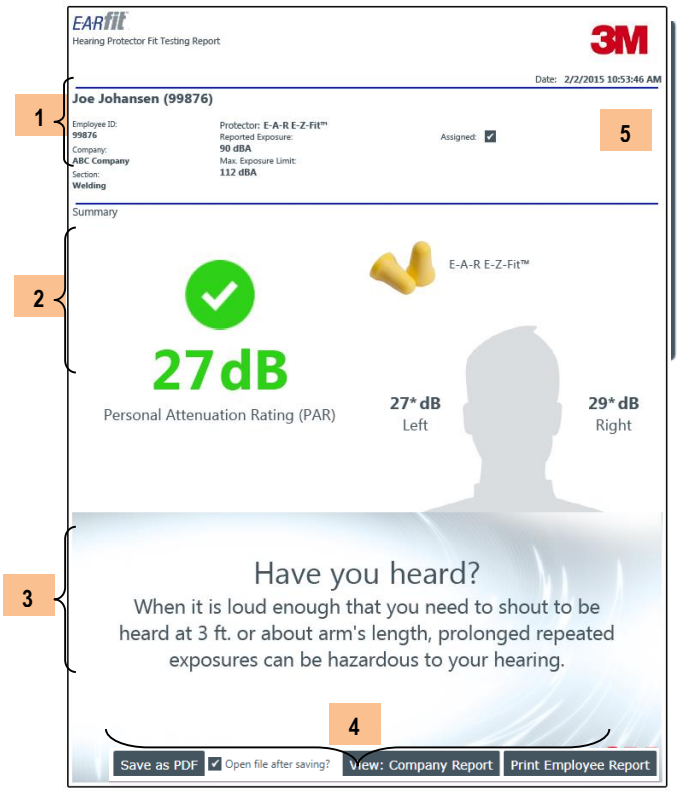


Figure 20: Employee Report Example

Employee report	Explained
1. General information	At the top of the report, the employee's general information is provided along with the tested hearing protector, reported exposure (this is the inputted value via the add/edit employee data), the calculated maximum exposure limit, and assigned checkbox. The date and time and optional company logo is presented in the report header.
2. Summary	The PAR minus the uncertainty is displayed with the hearing protector product type. The left and right PAR values are also displayed.
3. Educational messages	Educational messages rotate through to increase hearing loss prevention awareness.
4. Action buttons	Save as PDF –allows you to save the file in a local directory. View: Employee Report Used to toggle between company and employee reports. Note that these buttons change when clicked. "View" toggles between employee and company. "Print" enables you to print the viewed report and will toggle based on the "View". Print Company Report Used to print the selected company report. "The open file after saving" is selected as the default in order to quickly view the report after saving as a .pdf. Uncheck to disable this feature.
5. Slider bar	Select the slider bar to scroll up/down through the report (see 7).

Table 5: Employee Report Explained

Company Report

The company report provides additional fit test detail desired for company record-keeping. A signature line is available for companies who wish to have employees sign after they have been tested. The company report actions are identified in Table 6.

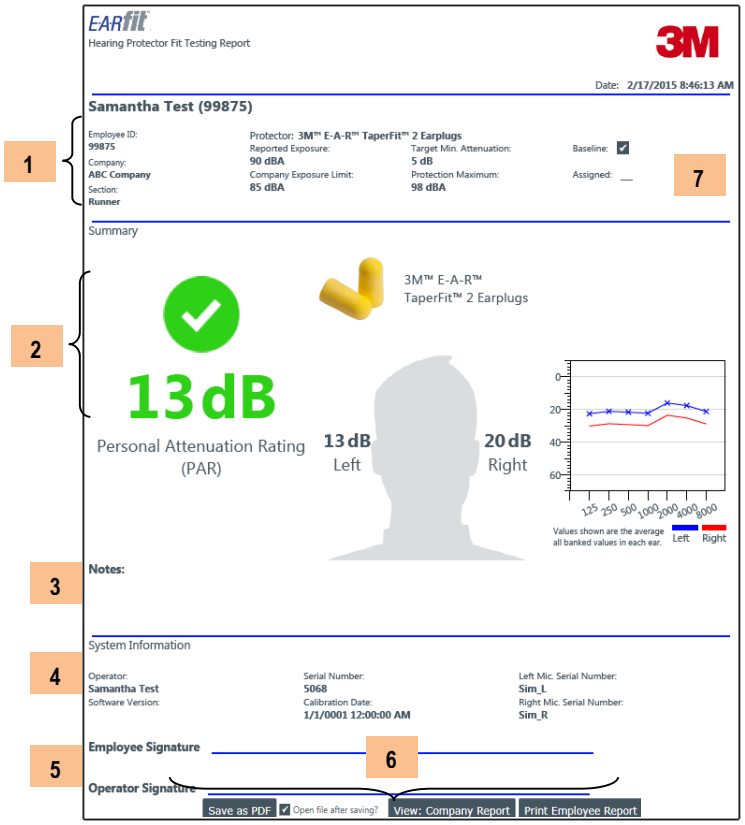


Figure 21: Company Report Example

Company report	Explained
1. Employee and Hearing Protector Information	At the top of the report, the employee's general information is provided and includes: hearing protector type, the reported exposure, company exposure limit, targeted minimum, maximum attenuation calculations, and if the baseline and/or assigned were selected during the testing.
2. Measurement data	The company test results summary displays the PAR minus uncertainty values for left, right, and binaural as well as the attenuation graph.
3. Notes field	Operator's notations are displayed here.
4. System information	The system information includes the operator's name, software version, speaker serial number, date and time calibration occurred of the last factory calibration, and the serial numbers for the left and right microphones.
5. Signatures	The employee and operator signatures may be hand signed after printing.
6. Action buttons	Save as PDF –allows you to save the file in a local directory. View: Employee Report Used to toggle between company and employee reports. Note that these buttons change when clicked. "View" toggles between employee and company. "Print" enables you to print the viewed report and will toggle based on the "View". Print Company Report Used to print the selected company report. "The open file after saving" is selected as the default in order to quickly view the report after saving as a .pdf. Uncheck to disable this feature.
7. Slider bar	The slider bar is used to scroll up and/or down the report.

Table 6: Company Report Explained

Data Manager

The data manager is used as a user support portal to manage the company, employee, and operator data without having to have hardware connected. Additionally, reports can be generated, fit-test data can be exported and data from 3M™E-A-Rfit™ 4 database files can be imported. The following sections outline how to use these operator tools.

Company records

In lieu of the home page, the **Company Tab** may be used to modify, add,or delete company data or records. The required fields are noted by an asteriks which include the name, country and company exposure limit. The company exposure limit is a required value and is used to compute the the target minimum attenuation, the protected exposure and protection maximum value.

✓ **Tip**: to change the field labels for the employee ID, employee section, and/or employee function you may enter in a different field decriptors, if desired. When saved, these will appear in the E-A-Rfit software screens and in the reports.

➢ To **add, edit, and delete a company**, do one of the following:

1. To **add a company**, click on the Add icon. Fill in the appropriate fields noting the company is a required field with red outline shading. Use the drop down arrow and type the first few letters to quickly find and then click to Save button.
2. To **Delete a company record,** click on the Delete icon.
3. To **Edit a company**, click on a specific company name (see below). Type over or highlight and the delete the text. Then enter the new information. Click Save.

☑ ***Note***: to cancel, click the Home icon or select a different tab without saving.

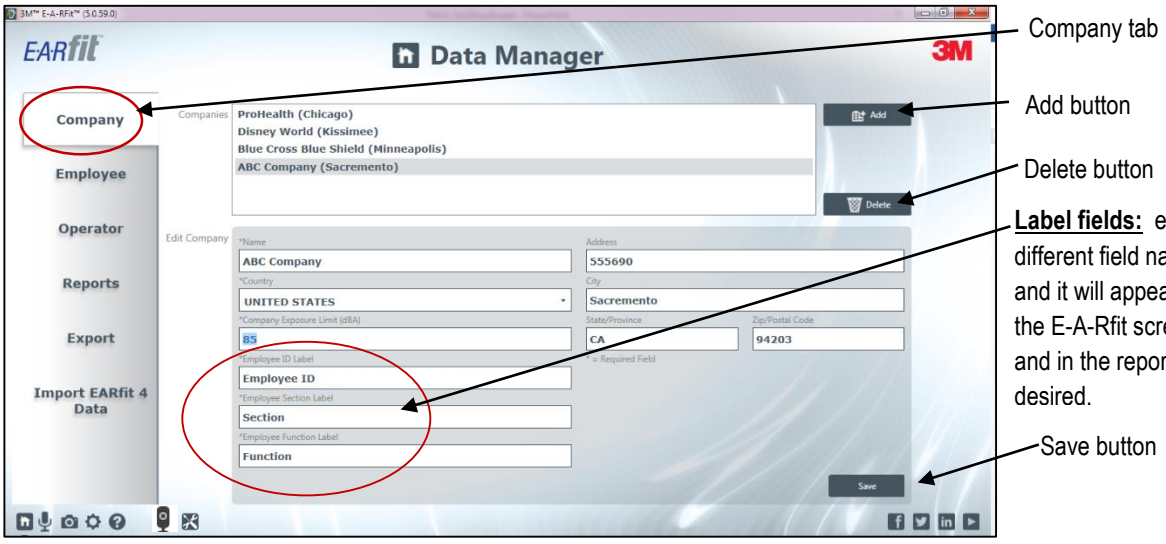


Figure 22: Data Manager - Company Tab

Important: Responsibility for Data Privacy and Security

Purchaser is solely responsible for complying with all privacy and security-related laws and regulations applicable to the collection, storage, use, import and export of all data (personally-identifiable or otherwise) entered into, or generated by, the 3M™ E-A-Rfit™ Dual-Ear Validation System. Access to the 3M E-A-Rfit Dual-Ear System is not password-controlled. Purchaser should implement all necessary administrative, physical and technical safeguards it determines are necessary to ensure the integrity, confidentiality and security of the data against both internal (e.g., access by unauthorized personnel, misuse of data) and external threats (e.g., "hacking").

Employee records

The **Employee Tab** of the data finder page may be used to add, edit, delete, and import employees into the 3M™ E-A-Rfit™ Dual-Ear Validation System database. The first name, last name, country and the employee's exposure level are the required fields when completing these records. If there is no employee's exposure level available, you may click the "exposure data not available" check box. However, if not selected, this will affect the protected exposure results displayed in the Detail View of the Test Results page.

➢ To **add, edit, and delete employee**, do one of the following:

1. To **add an employee**, click on the Add icon. Fill in the appropriate fields noting the company is a required field with an astricks. Use the drop down arrow and type the first few letters to quickly find and then click the Save button.

2. To **Delete an employee record,** click on an employee's name in the employees name box and then click on the Delete icon.

3. To **Edit an employee**, click on a specific company name (see below). Type over text (or highlight, delete, and enter text) with new information. Click Save button.

☑ ***Note***: to cancel, select a different tab or click on the home screen.

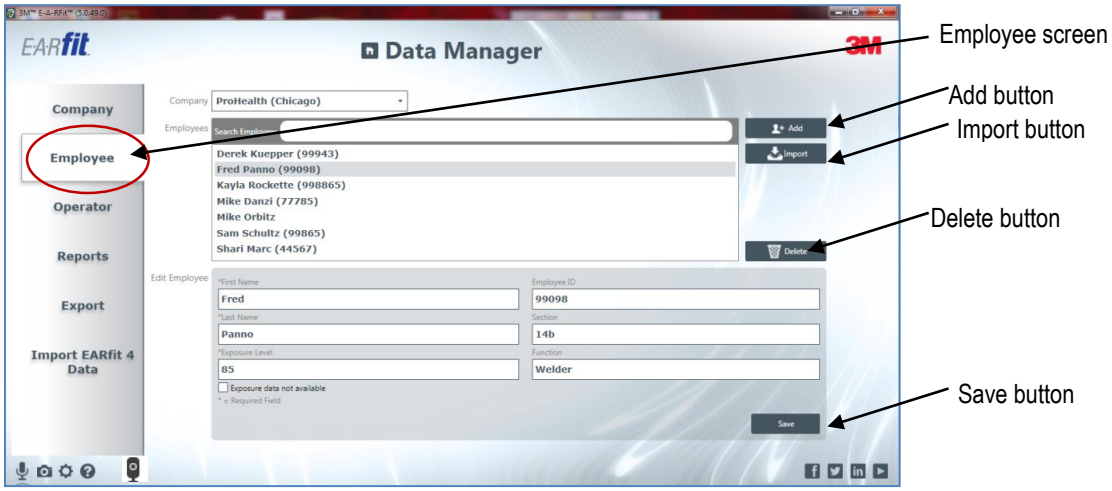


Figure 23: Data Manager - Employee Tab

Importing Employee Data

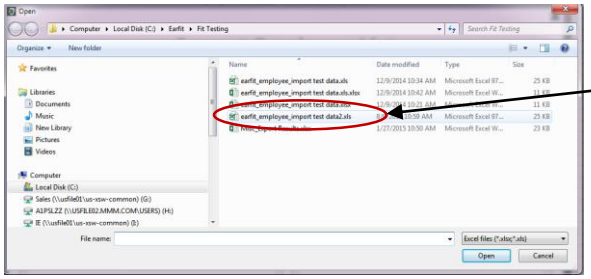
The **Import** feature enables an administrator to import the company's employees whom will be fit tested via an existing Excel spreadsheet. Once the employee data is imported, you have the option to map the Excel file fields to the E-A-Rfit Dual-Ear Validation System database.

➢ To **import (or add-in) employee data,** follow below:

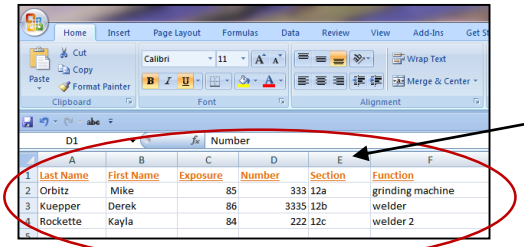
1. To import, click on the Import button when **Employee** tab is selected from the Data Manager page (see Figure 23).

2. In the **Import Employee** list dialog box, select Open Data File button.

3. Map the pre-existing employee record file via your network/pc folder. Select the file. Below is an example of a pre-existing **Employee Record** file which details last and first names, exposure, number (mapped to employee ID), department/section, and function.



Employee record file: example of mapping the file example



Loads the column headings into the data file fields drop down boxes.

4. Select the dropdown box data file fields to map the fields. Example: "Last" is mapped to "Last Name" and "Number" is mapped to **Employee ID** (refer to Figure 24).

5. Select the Apply Mapping button. A preview of the import data appears in the right preview pane of the **Import Employee List** (refer to Figure 24).

6. Click Import to EARfit button when correct (refer to Figure 24). *Note: if Import to EARfit button is reselected, the data will create duplicate employee entries which may be manually deleted.

7. (Optional): Select **Save Template** (to save the mapped files) and select **Load Template** to reload.

7. Close the dialog box via "x" (refer to Figure 24). The imported employees will appear in the Employee's field of the **Data Manager**.

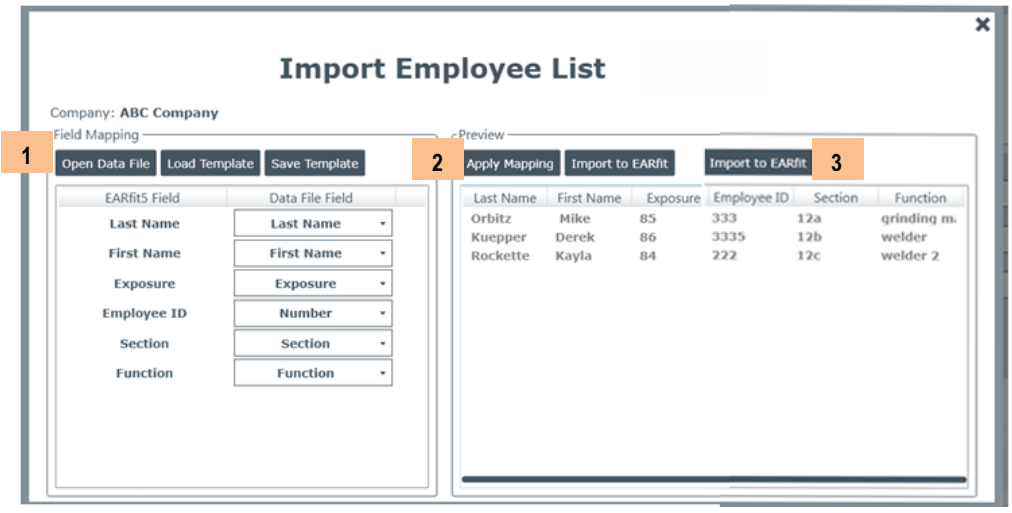


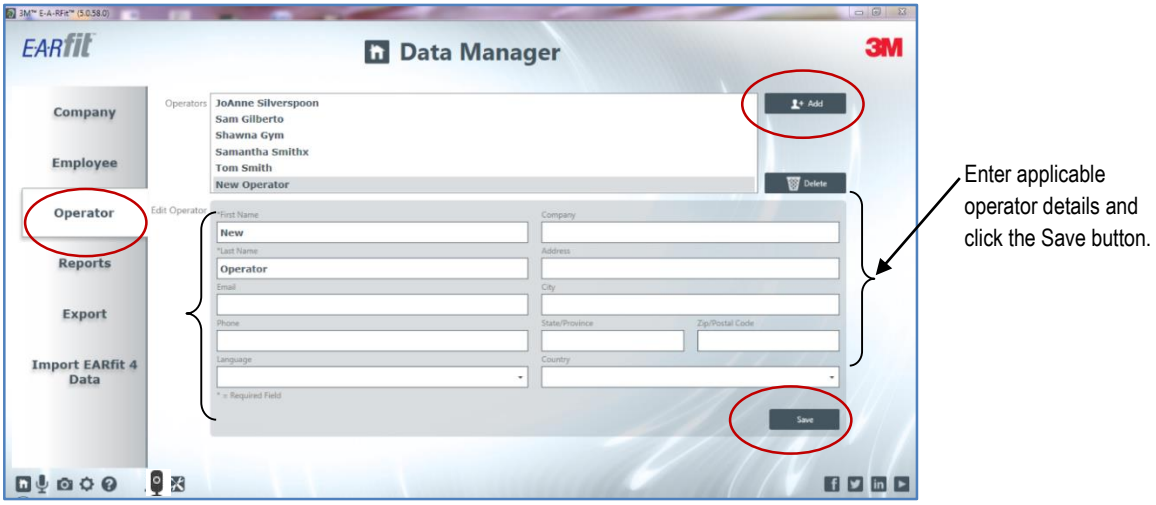
Figure 24: Import Employee List

Operator records

In the **Operator Tab** of the Data Manager, you may add, edit, and delete operator/safety personnel information. The operator information is saved and is presented in "system information" section of the Company Report.

➢ To **add, edit, delete, and or view operator information**, follow below:

1. Click the Add button to add an operator. Fill in the appropriate fields noting the first and last names are the required fields. Use the drop down arrow and type the first few letters to quickly find and then click the Save button.



2. To **Edit** and/or **Delete an Operator**, do one of the following:

- In the operator's window, select an operator. To **Edit/Change** the information, click in desired fields and enter in new information. Click the Save button.
- To **Delete**, click on a name from the Operators section and select the Delete button.

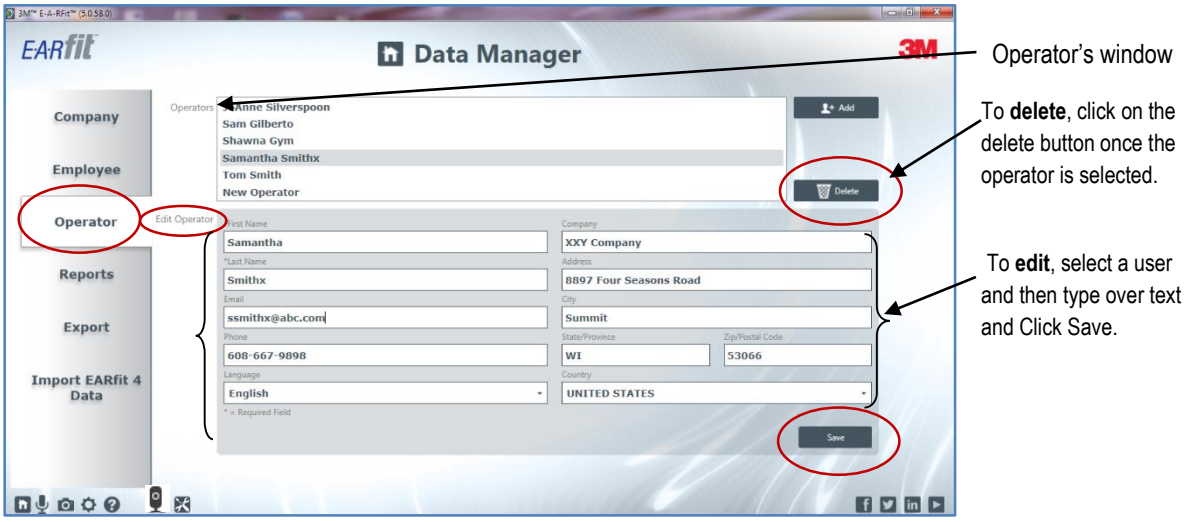


Figure 25: Data Manager - Operator Tab: Edit and/or Delete

Reports Tab

In the **Reports Tab** of the data manager, you can generate the hearing protector fit test reports.

➢ To create reports, do one of the following:

1. Select a **Company** from the drop-down list.
2. In the employee selection, click in one of the following: select latest visits, select dates, select all, and/or unselect all.
3. Select either Employee Report or Company Report by clicking in the appropriate radio button.
4. Click **Generate Reports** button. The selected reports will appear on your screen to view, save as .pdf, and/or for printing.

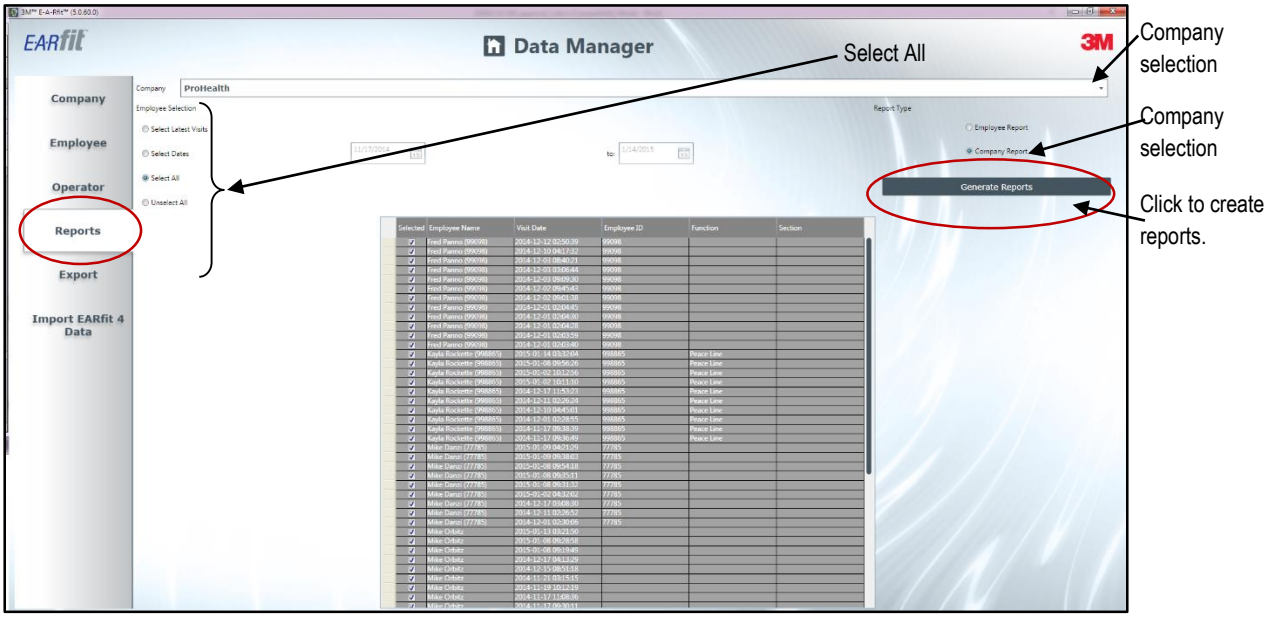


Figure 26: Data Manager - Reports Tab

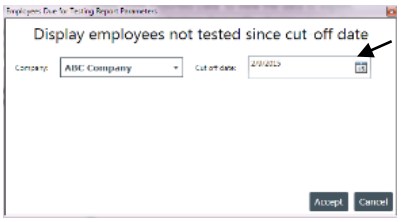
Export Tab

In the **Export Tab** of the data manager, you may run an export or data query of the stored fit-test data.

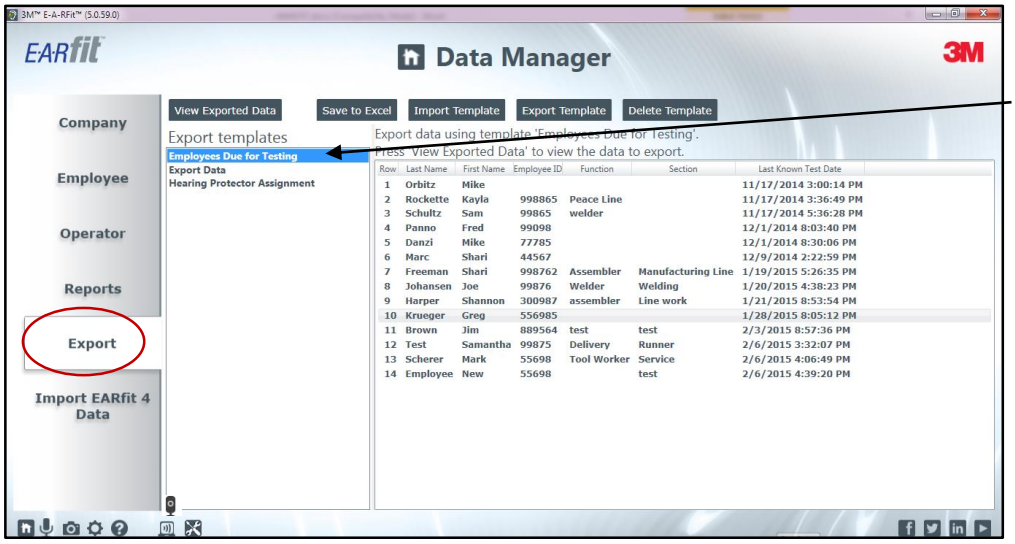
There are three **Export** options which are illustrated and explained below.

- **Employees due for testing** – this data query will provide a list of employees due for testing for a given company. The query can be filtered by a selected cut-off date parameter. The query results will display the employee name, the employee ID, their function and section, and the last known test date.

- To **run this export**: double click on the "**Employees Due for Testing**". Select the company and date parameters. Click **Accept**. The following will be displayed. `



Select the two parameters and click Accept to continue your data query.

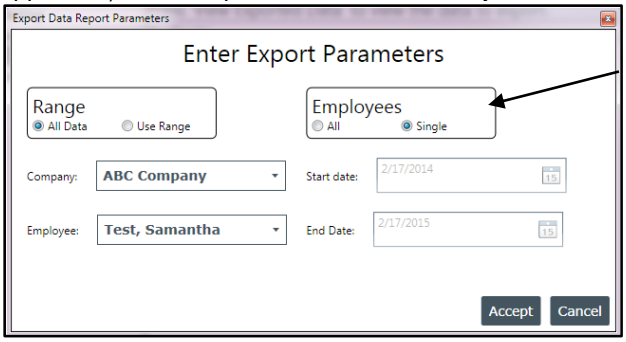


Select Employees due for testing. Add parameters. Then click View Exported Data button. Data appears on screen.

Figure 27: Export with Employees due for Testing Example

- **Export Data** – this data query will provide all fit-test data information when filtered by company, by all employees or by specific employee. (Note: use the horizontal slider bar at the bottom of the export window to view all the data fields.)

- To **run this export**: double click on the "**Export Data**". Select the range, employees, company, employee (if applicable) and date parameters. Click **Accept**. The following will be displayed.



Select parameters and click Accept to continue your data query.

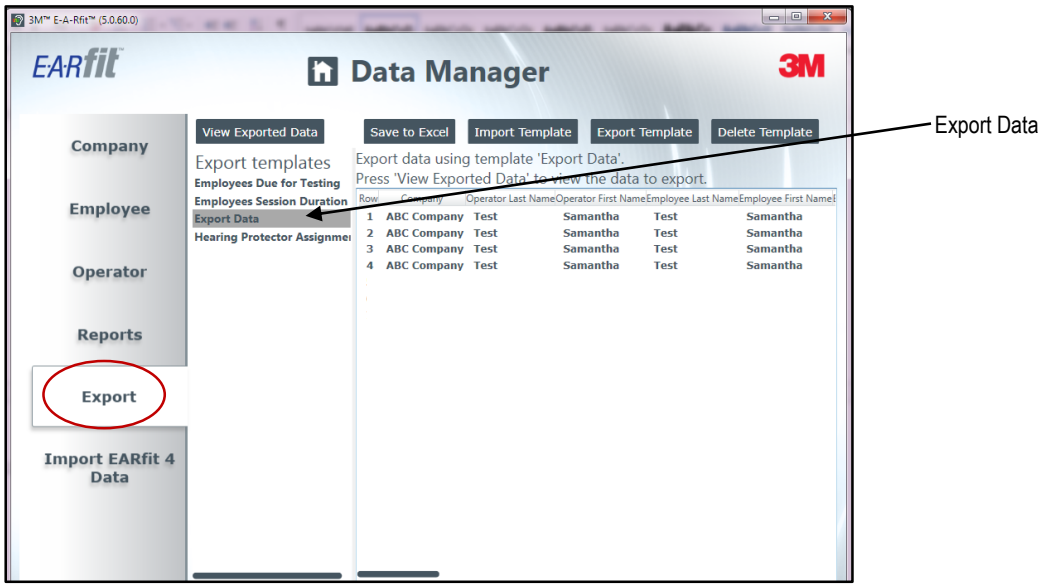


Figure 28: Export Data Query Example

- **Hearing Protector Assignment** – this data query filters by company and will display the company, all employees fit-tested, the fit-test visit dates, the product tested, and the left PAR, the right PAR, and the Binaural PAR values.

- To **run this export**: double click on the "**Hearing Protector Assignment**". Select the company and click **Accept**. The following will be displayed.

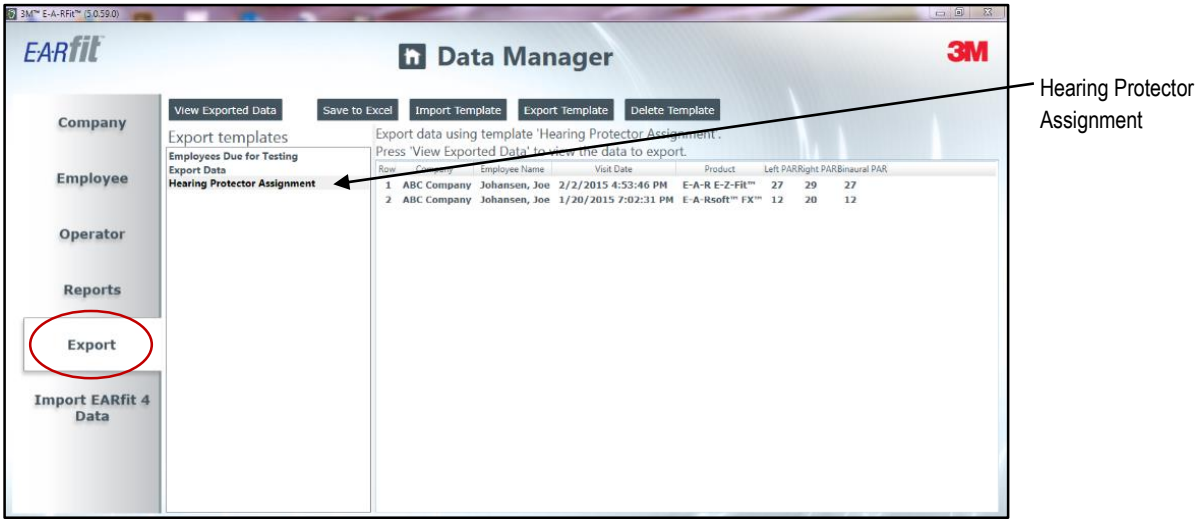


Figure 29: Export Hearing Protector Assignment Example

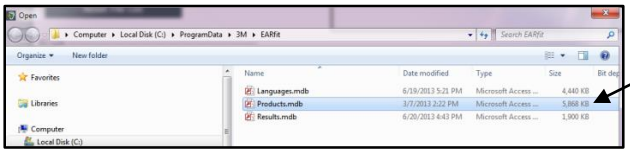
✓ ***Note:*** If there is a data query you would like customized, please contact the technical services as outlined in the "User Support" section at the end of the user manual.

Import 3M™ E-A-Rfit™ 4 Data Import

This feature is used to Import EARfit 4 data into the 3M™ E-A-Rfit™ Dual-Ear Validation System software.

1. **To Import E-A-Rfit4 database files**, click on the Select EARFit 4 database files button.

2. Select the files from your computers directory and click **Open**.



3. The files will appear in the Selected Files listing (see 1) of the Data Manager screen. Click the Import selected databases button. The program will display when the import completed importing the files (see 2).

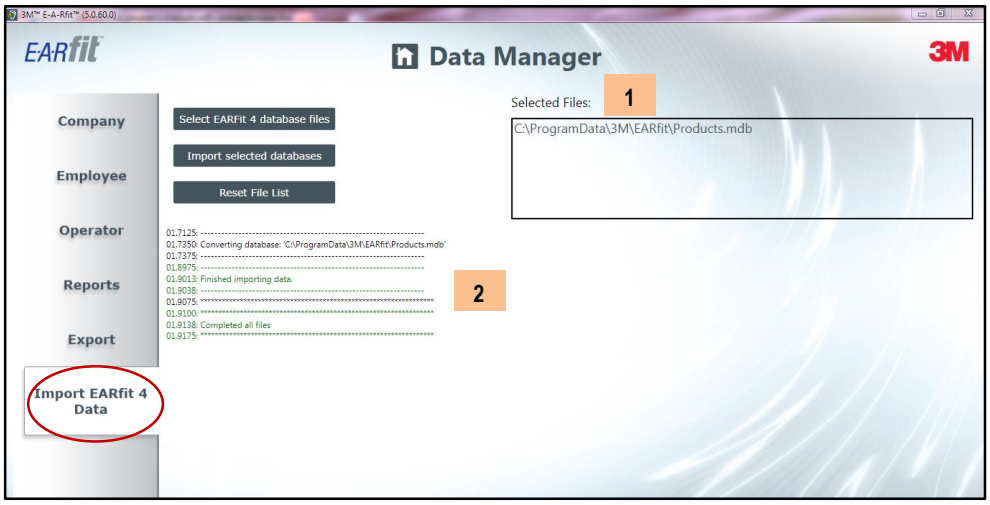


Figure 30: Import E-A-Rfit 4 Data Tab

Settings

Database folder location option

In the "Database" tab, you can determine where you wish to store your test results, either on the local hard drive or remotely to a SQL Server of your choice. You may also store your test results on a remote server not on your local hard drive (without using SQL). By default, the data is stored on the local hard drive on your computer. Note: be sure to consult your company IT department before proceeding.

1. To change the database location, click on the ⚙ icon select the Browse button.
2. Select a mapped location and click **Ok**.
   - Click the Reset button to revert back to the default saved location.
3. Advanced user option: click store results remotely to SQL server checkbox. Then, enter a SQL Server Connection String and click **Test**. Click **Save**.
   - ***Note***: this allows the database to run in a different mode while prohibiting software updates. For software updates, please refer to the ear.3m.com website.)

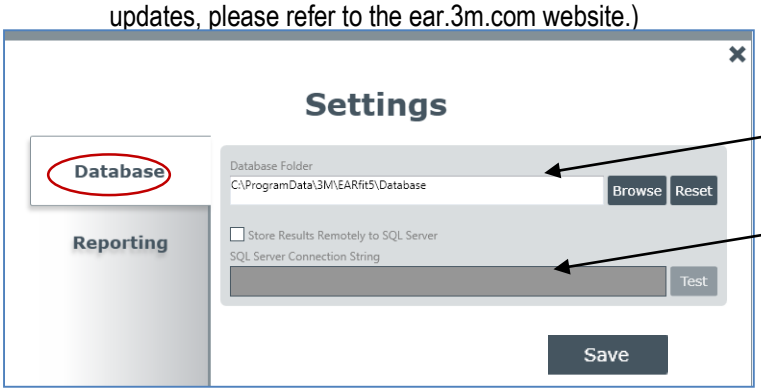


Figure 31: Import Data Screen

Reporting Tab

In the **Reporting Tab**, you can select the location of the Report Queries folder via the Browse button or click Reset to allow the local drive default location.

In the **Reporting Tab**, the company logo image on the reports can be customized via the Browse button. Reset to return back to the 3M Company logo which is set as the default.

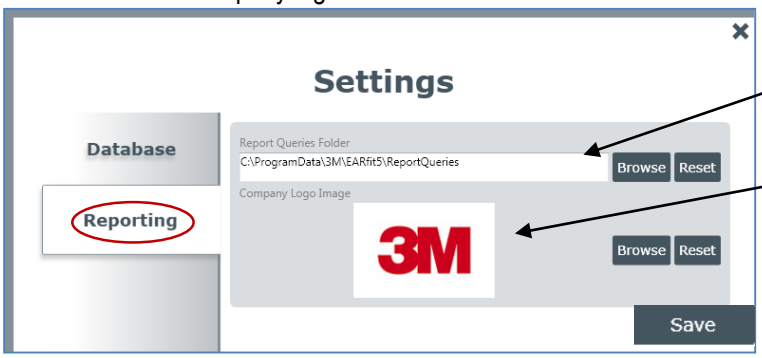


Figure 32: Settings -Report Tab

Software updates

Software update messages will appear on the bottom of the home screen.

- To update: Click on the message box. Click Run button.

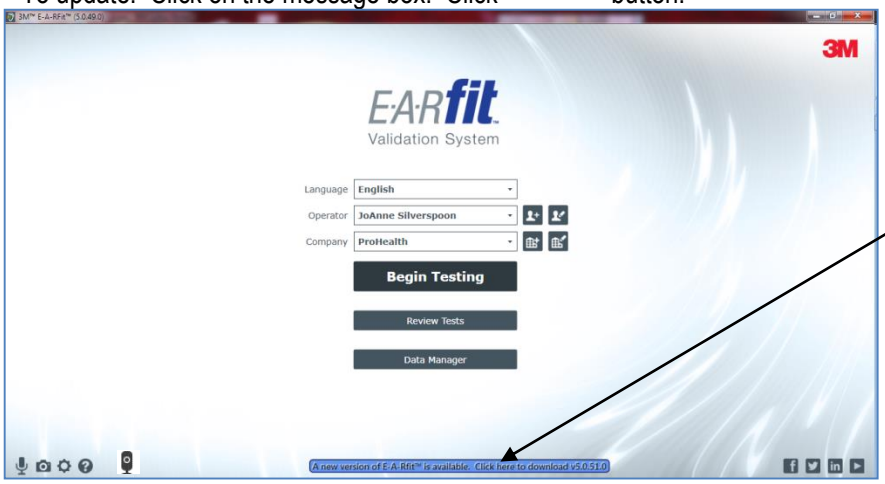


Figure 33: Software Update Prompt Example

- ***Note***: you will have to close the E-A-Rfit screen behind the small wizard box. Click as displayed below. Follow the install wizard prompts by selecting **Next** through each screen. Click **Finish** at the last screen. **Reopen** the software.

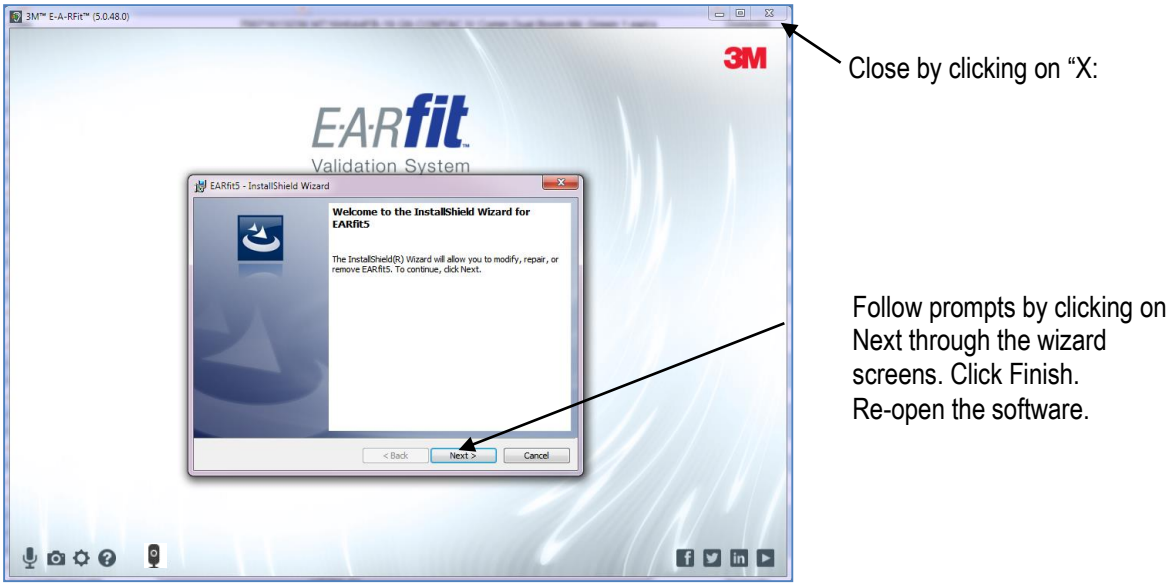

3M™ E-A-Rfit™ (5.0.48.0)
3M
E-A-Rfit
Validation System
EARfit5 - InstallShield Wizard
Welcome to the InstallShield Wizard for EARfit5
The InstallShield(R) Wizard will allow you to modify, repair, or remove EARfit5. To continue, click Next.
< Back
Next >
Cancel
Close by clicking on "X:
Follow prompts by clicking on Next through the wizard screens. Click Finish. Re-open the software.

Figure 34: Install Shield Wizard for Software Updates

Appendix A: Specifications

Standards/Directives/References

- IEC 61010-1 (2010 Revision/Edition 3.0). "Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements". International Electrotechnical Commission.
- EN 61326-1 (2013 Revision/Edition 2.0). "Electrical equipment for measurement control and laboratory use – EM requirements- Part 1: General Requirements." International Electrotechnical Commission.
- Code of Federal Regulations (CFR): Title 47, Part 15 Subpart B. (2012 Revision.). "Radio Frequency Devices, Unintentional Radiators." Federal Communications Commission.
- ROHS/ Directive 2011/65/EU (June 8, 2011). "The Restriction and Use of Certain Hazardous Substances in Electrical and Electronic Equipment." European Parliament and the Council of the European Union.
- WEEE/Council Directive 2002/96/EC. "Waste Electrical and Electronic Equipment." European Parliament and the Council of the European Union.
- Safety/Council Directive 2006/95/EC. "Low Voltage Equipment Safety." European Parliament and the Council of the European Union.
- EMC/ Council Directive 2004/108/EC. "Electromagnetic Compatibility." European Parliament and the Council of the European Union.
  hnh
- CE mark. European Conformity. (Conformité Européenne.)

US Patents

3M.com/patent

Measurements Computed

Octave band data computed in:	125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz, 4000 Hz, 8000 Hz
PAR	Personal attenuation rating
Frequency weighting	A

Mechanical Specifications

Speaker housing	Aluminum, black material
Speaker size	6.5" long x 3.75" width x 6" depth; 2.54cm long x 9.5cm width x 15.24cm depth
Speaker Weight	3.1 lbs; 1406.1 grams
Speaker Status Indicators	**LED Red blinking indicator light** – signifies USB is not connected. It will disappear when connected successfully. **LED Green Indicator light** – signifies power is on.

Power Supply and Operating Conditions

Voltage	120 to 240VAC
Frequency	50-60 Hertz
Current	250 mA

Environmental Operating Conditions

Altitude	3000 (maximum) meters
Operating temperature	5 °C to 40 °C (41 °F to 140 °F)
Relative Humidity	80% for temperatures up to 31°C (87.8 °F) ; decreasing linearity to 50% at 40°C (140 °F)
Voltage Range	12 Volts DC
Transient overvoltage	Impulse withstand (overvoltage) category II. Rated pollution degree 2.

User Interface requirements: ports and connectors

AC/DC output (power)
2 LED indicators
USB connector
Power connector

Software requirements

Screen Resolution	1024 X 768 pixels (minimum)
Operating System	Microsoft Windows 7 Professional, 32-bit and 64-bit Microsoft Windows 8, 32-bit and 64-bit Microsoft Windows 10, 32-bit and 64-bit Microsoft .NET Framework: Net4Full 4.0.30319.1, Net4Client
USB Port	1 USB port available
Pointing Device	If the screen is not a touch screen, a pointing device, such as a mouse is required.
Internet Connection	Internet is required for some features such as Software Updates and How-To Videos.
MicroProcessor Required	1 GHz or faster 32-bit (x86) or 64-bit (x64) processor
Memory Required	1 GB RAM (32-bit) or 2 GB RAM (64-bit)
Additional Disk Space	100 MB

Appendix B: model, parts, and accessories

Kit Components

3M ID	3M™ E-A-R™ Dual-Ear Validation System Kit Components
70-0716-7411-6	3M™ E-A-Rfit™ Dual-Ear, Enclosure Speaker Assembly (073-783); Dual-Ear Microphone/Cable Assembly (073-781); Dual-Ear ¼"-20 to 5/8"-27 Speaker Stand Adaptor (073-096); Test plug kit (693-1000); 3M™ SecureFit™ Protective Eyewear (70-07164-7682); Microphone stand (393-0003); USB cable (393-0007); Power cord/supply (053-825); 3M™ Roll Model (319-1003); 3M™ Eargauge (85099-00000); Tweezers (073-092); USB flash drive with software install and user manual (093-411); antistatic ziplock bag (293-0008); Removable microphone clip (2) (073-100); Carrying case assembly (073-784).

3M™ Probed Test Hearing Protectors Accessories (Sold Separately)

The following 3M™ Hearing Protector Test Probes are used for testing and may be purchased through a 3M distributor.

Probed Product image	Product Number	3M Stock ID Number	UPC Number	Description
	393-2000-50	70071562741	10080529190731	3M™ E-A-Rsoft™ Yellow Neons™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2001-50	70071562758	10080529190748	3M™ E-A-R™ UltraFit™ Probed Test Plugs 50 EA/Case (5 bags of 10 pair each)
	393-2002-50	70071562766	10080529190755	3M™ E-A-R™ Push-Ins™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2003-50	70071562774	10080529190762	3M™ E-A-R™ Classic™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2004-50	70071562782	10080529190779	3M™ E-A-Rsoft™ FX™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2005-50	70071562790	10080529190786	3M™ E-A-R™ E-Z-fit™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2006-50	70071562808	10080529190793	3M™ E-A-R™ TaperFit™ 2 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2007-50	70071562816	10080529190809	3M™ Classic™ Small Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2008-50	70071562725	10080529190816	3M™ E-A-R™ Express™ Pod Plugs™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2009-50	70071562733	10080529190823	3M™ Classic™ Plus Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2010-50	70071577772	10080529190871	3M™ 1100 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2011-50	70071647740	10093045937124	3M™ Tri-Flange™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2012-50	70071647757	10093045937131	3M™ Skull Screws™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)

Probed Product image	Product Number	3M Stock ID Number	UPC Number	Description
	393-2014-50	70071650249	10078371659490	3M™ E-A-Rsoft™ Yellow Neons™ Large Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2015-50	70071650298	10078371660397	3M™ E-A-R™ Push-Ins™ with Grip Rings Probed Test Plugs/50 PR/Case (5 bags of 10 pair each)
	393-2013-50	70071650231	10093045937483	3M™ No Touch™ Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2016-50	70071654423	10078371664838	3M™ 1260/1270/1271 Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2017-50	70071673142	10078371666085	3M™ Pomp Plus Probed Test Plugs 50 PR/Case (5 bags of 10 pair each)
	393-2018S-50	700716-74132	10078371667570	3M™ Combat Arms™ 4.0 Probed Test Plugs - Small 50PR/Case (5 bags of 10 pair each)
	393-2018M-50	7007167327-4	10078371667587	3M™ Combat Arms™ 4.0 Probed Test Plugs-Medium 50 PR/Case (5 bags of 10 pair each)
	393-2018L-50	7007167414-0	10078371667594	3M™ Combat Arms™ 4.0 Probed Test Plugs-Large 50 PR/Case (5 bags of 10 pair each)
	393-2020-50	70071674157	10078371667600	3M™ E-A-Rcaps™ Model 200 Hearing Protector Test Pods 50 PR/Case (5 bags of 10 pair each)
	393-3001-2	70071691110	10078371668341	3M™ PELTOR™ Earmuffs X1/X2 Probed Test Cushions, 2PR/CS
	393-3003-2	70071691128	10078371668358	3M™ PELTOR™ Earmuffs X3 Probed Test Cushions, 2PR/CS
	393-3005-2	70071691136	10078371668365	3M™ PELTOR™ Earmuffs X4/X5 Probed Test Cushions, 2PR/CS

Table B-1: 3M™ Hearing Protector Test Probes

Contacting 3M™ E-A-Rfit™ Dual-Ear Validation System

User Support (US)

Should your 3M equipment need to be returned for repair or for recalibration, please contact the one of the following in the United States:

- **Technical Support**: **1-800-243-4630**
- **Customer Service and/or Service:** **1-800-245-0779**
- **Direct Government Orders:** **1-800-752-3623**
- **User support website:** **EARfit.3M.com**

Outside US Customers

Please contact your local 3M Technical Service person to coordinate the service or repair.

Guidelines for Calibration/Repair Return:

1. Contact Customer Service and/or Service as stated above in “User Support”.
2. Package the unit(s) in accordance with the shipping guidelines.
3. Once the shipment is received, the Service Center will complete the requested calibration or Diagnostic Analysis.

Shipping Guidelines

1. All material must be packaged in an appropriate container that will ensure undamaged delivery. Options include double corrugated cardboard boxes or shipment in original E-A-Rfit case.
2. Ensure all parts within the box are packed in such a way to prevent movement within the box.
3. Speakers returned for calibration that include a microphone clip fastened to the grill must be protected with an appropriate wrapping for protection (if not returned in the original E-A-Rfit case).
   - Contact the 3M Customer Service (800-245-0779) for additional assistance, if needed.
   - Please refer to the following for additional information: 3M™ E-A-Rfit™ Repair Service Guide via **Earfit.3m.com**

Calibration

A calibration once every two years is recommended.

- For additional details please refer to: Calibration Policies for 3M™ E-A-Rfit™ Validation Systems

Warranty

3M warrants our instruments to be free from defects in materials and workmanship for 90 days under normal conditions of use and service. For United States customers, we will replace or repair (our option) defective instruments at no charge, excluding batteries, abuse, misuse, alterations, physical damage, or instruments previously repaired by other than 3M. Microphones, sensors, printers, and chart recorders may have shorter or longer warranty periods. This warranty states our total obligation in place of any other warranties expressed or implied. Our warranty does not include any liability or obligation directly resulting from any defective instrument or product or any associated damages, injuries, or property loss, including loss of use or measurement data.

Limitation of Liability: 3M takes no responsibility and shall bear no liability for use or misuse of individual or personally identifiable data. All responsibility for such data resides with the purchaser and/or employer.

For warranty outside the United States, a minimum of 90 day warranty applies subject to the same limitation and exceptions as above with service provided or arranged through the authorized 3M distributor or our 3M European Service Laboratory. Foreign purchasers should contact the local 3M authorized sales agent for detail.

Responsibility for Data Privacy and Security

Purchaser is solely responsible for complying with all privacy and security-related laws and regulations applicable to the collection, storage, use, import and export of all data (personally-identifiable or otherwise) entered into, or generated by, the 3M™ E-A-Rfit™ Dual-Ear Validation System. Access to the 3M E-A-Rfit Dual-Ear System is not password-controlled. Purchaser should implement all necessary administrative, physical and technical safeguards it determines are necessary to ensure the integrity, confidentiality and security of the data against both internal (e.g., access by unauthorized personnel, misuse of data) and external threats (e.g., "hacking").

E-A-Rfit™

The Right fit test. Right now.

3M™ E-A-Rfit™ Dual-Ear Validation System.

Personal Safety Division
3M Center - Building 235 - 2W-70
St. Paul, MN 55144-1000
Technical Assistance: 1-800-243-4630
Customer Service: 1-800-245-0779
EARfit.3M.com

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